



DEHUMIDIFIER

DehuTech 2400

Technical Manual

Valid from serial no: 690502



EC-declaration of conformity

Fuktkontroll AB
Enhagsslingan 23
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Sweden

declare under own responsibility that the product:

Dehumidifier DehuTech 2400 (type DA-2400 in Swedish market) from unit no 690502

which is detailed in this declaration complies to the following harmonised European standards and technical specifications:

SS-EN 60335-1 issue 2	Electrical domestic appliances - general requirements
SS-EN 60335-2-40 issue 1	Specified requirements for electrical heat pumps, air conditioning units and dehumidifiers.
SS-EN 60335-2-40/A51 issue 1	Specified requirements for electrical heat pumps, air conditioning units and dehumidifiers.

amendments **SS-EN 60335-1 T1, T2, T3, T4, T5**

according to conditions in directive:

73/23/EEG Low Voltage Directive

93/68/EEG Amendment

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Ulf Rahle, Managing Director

Contents

General safety information.....	4
Applications.....	5
Method of operation.....	5
Product description.....	6
Casing.....	6
Rotor.....	6
<i>Rotor drive system.....</i>	<i>6</i>
<i>Rotor bearings.....</i>	<i>6</i>
Filters.....	6
Fans for process- and reactivation air.....	6
Heater for reactivation air.....	6
Electrical panel.....	6
Operation options.....	6
Installation.....	7
Installation and service access.....	7
Duct connection for permanent installation.....	7
<i>Wet air duct out from dehumidifier.....</i>	<i>7</i>
<i>Reactivation air into the dehumidifier.....</i>	<i>7</i>
<i>Process and dry air with the dehumidifier installed in the dehumidified room.....</i>	<i>7</i>
<i>Process and dry air with the dehumidifier installed outside the dehumidified room.....</i>	<i>7</i>
Electrical installation.....	7
Commissioning.....	8
Maintenance.....	9
Filters.....	9
Rotor.....	9
Electrical motors.....	9
Heater.....	9
Rotor drive belt.....	9
Sealings.....	9
General summary of maintenance intervals.....	10
Transportation.....	10
Fault finding.....	11
Technical data.....	12
Performance chart.....	12
Dimensions.....	13
Technical data.....	13
Spare parts list.....	14
Component data.....	15
Miscellaneous / Notes.....	17
Appendix 1 - Electrical wiring.....	18

General safety information

- Anyone operating the DehuTech 2400 should have access to this manual, and should be aware of the safety information.
- Only personnel with adequate knowledge of the dehumidifier should be allowed to operate and service it.
- Only personnel with authorisation for electrical installations are allowed to make repair of electrical components.
- Repair of electrical components should be carried out by suitable qualified personnel.
- The dehumidifier must not be installed in areas where explosion proof equipment is required.
- Disconnect the dehumidifier from the mains prior to opening any service panel.
- Prior to servicing the dehumidifier must be left to cool down for at least 15 minutes after operation.
- The service panels should remain closed except when servicing is carried out.
- The dehumidifier can only be used for dehumidification of air at atmospheric pressure.
- Never use the dehumidifier without the filters as the desiccant rotor can become contaminated and lose capacity.
- Signs and instructions on the dehumidifier should not be removed or altered.
- This manual should always be accessible and kept close to the dehumidifier.
- All maintenance and control of the dehumidifier should be as per the specified schedule.
- Use only genuine spare parts.
- Written permission must be obtained from DehuTech AB prior to making any alteration or modifications.

Applications

Dehumidifier DehuTech 2400 is of the solid desiccant wheel type designed to dry air of atmospheric pressure. The dehumidifier can be used for drying air of up to 100 % relative humidity (RH) with temperatures from -30 °C to +40 °C.

The applications are numerous and wide spread. Below are some examples:

- Controlling humidity levels in production processes.
- Drying of temperature sensitive products.
- Maintaining correct humidity in storage areas.
- Protection of equipment sensitive to corrosion.
- Controlling humidity levels in museums and archives.
- Drying after water damage and drying of buildings during construction.
- Climatic improvements in damp areas.

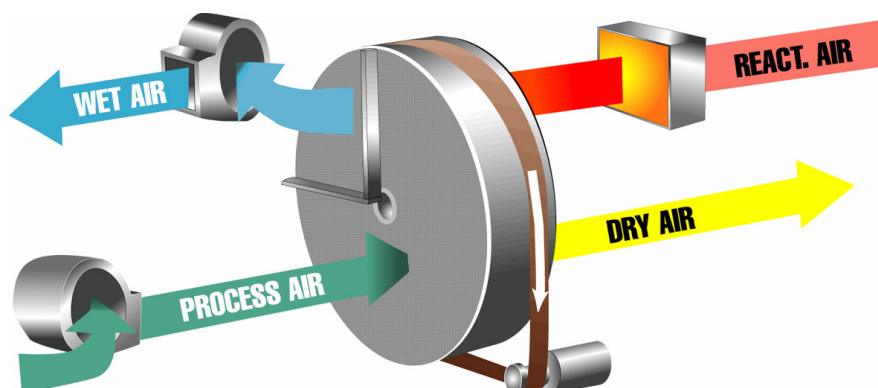
Method of operation

The dehumidifier operates with two air streams. A larger air stream to be dehumidified, and a smaller air stream to exhaust the moisture out of the desiccant rotor.

Two fans inside the dehumidifier create air streams which travel through the desiccant rotor in opposite directions.

The larger air volume, the process air, passes through the slowly rotating silica gel rotor. Silica gel is a hygroscopic material adsorbing water vapour direct from the air. When passing through the rotor the humidity of the air is reduced, whilst the moisture content of the rotor material increases. On exiting the rotor the dried air is introduced into the area, or the process to be dehumidified. The adsorption process works in temperatures from -30 °C to +40 °C.

The smaller air volume, the reactivation air, adsorbs the moisture from the silica gel rotor. This reactivation air is heated by an internal heater to a temperature of approximately +100 °C. As the reactivation air passes through the rotor, in an opposite direction to the dry air, it will decrease the moisture content of the rotor material. The reactivation air will leave the dehumidifier as warm, moist air, which is then exhausted out from the building.



Product description

The dehumidifier is designed to meet the requirements of IEC protective class IP 44.

Casing

The casing is fabricated from stainless steel 2333. The top of the dehumidifier has a top panel that can be removed for service access to the electrical components. The front panel of the dehumidifier can be removed for service access to all mechanical parts. All duct connections to the dehumidifier are designed for connections to standard size spiral ducts.

Rotor

The dehumidifier has a drying rotor fabricated from a desiccant material. The rotor has a matrix of corrugated and flat heat resistant sheets which houses the Silica Gel desiccant agent. This matrix creates a large number of axial flutes through the rotor, which together builds up an immense surface area for moisture adsorption in a small volume. The rotor is manufactured and processed to be able to withstand moisture saturated air without being damaged. This means the rotor can be used in conjunction with a pre-cooling coil. Further more the rotor will not be damaged even if the fan or the heater for reactivation should fail during operation. The rotor is incombustible and non flammable.

Rotor drive system

The slow rotation of the rotor is achieved by an electrical gear motor and a belt drive. The belt sits on the outer rim of the rotor and is driven by a pulley on the drive motor. A belt tension device keeps the belt in place and maintains tension to prevent belt slip. Correct operation of the drive system, and direction of rotation can be checked by opening the front panel.

Rotor bearings

The centre hub of the rotor is equipped with ball bearings. The rotor shaft is made from stainless steel.

Filters

The dehumidifier has two separate filters. One in the process air inlet and one in the reactivation air inlet.

Fans for process- and reactivation air

The fans are direct driven radial fans with three phase standard motor class IP 54, ISO F. The fans are accessible for service after removing the panels.

Heater for reactivation air

The electric reactivation heater is divided into 2 heater banks. As an option the dehumidifier can be delivered with a heater for steam, hot water or LPG.

Electrical panel

The electrical panel is located in a separate compartment at the top of the dehumidifier. Switches and indications for operation are mounted at the front of the dehumidifier.

Operation options

Using the operation switch on the dehumidifier, different running options can be selected:

0	Dehumidifier not in operation.
MAN	Dehumidifier in continuous operation.
AUTO	Automatic operation by remote humidistat, or other external start/stop signal.

Inside the unit, there is a switch marked S3, that allows continuous operation of the dry air fan.

When the machine is turned off using the operation switch, the wet air fan is in operation for as long as it takes to cool off the heater element. Never use the main powerswitch to stop the machine, as it could overheat!

Installation

Installation and service access

Dehumidifier DehuTech 2400 is designed for indoor installation, and must be installed in a upright position, preferably bolted to the floor. For inspection and service, a space of 800 mm must be left free in front of the dehumidifier to accommodate for servicing of filters, fans and rotor.

Also ensure a space of 600 mm above the dehumidifier for inspection and service of the electrical panel, which is placed on top of the dehumidifier.

Duct connection for permanent installation

The dehumidifier can be installed in the room that should be dehumidified or in a separate room.

To obtain the best performance the outlets from the fans should be equipped with diffusers.

Wet air duct out from dehumidifier

The wet air from the dehumidifier should be exhausted to the outside. The duct should be as short as possible to minimise the chance of condensation of the wet air. This duct should slope down slightly to stop any condensed water from flowing back into the dehumidifier.

If the wet air duct is extremely long, or must be installed sloping upwards from the dehumidifier, it should be insulated and have a drainage point (2-4 mm) drilled at its lowest position.

A damper should be installed in the wet air duct to enable correct setting of the reactivation air volume during commissioning.

The exhaust opening should have a coarse wire net.

Reactivation air into the dehumidifier

The reactivation air duct into the dehumidifier should be as short as possible. The intake opening of the duct should have a coarse wire net, to stop foreign objects from entering the dehumidifier. No insulation is needed and the duct can slope up- or downwards. In some installations, as an alternative, the reactivation air can be taken from the installation room, for this alternative no duct connection is needed.

Process and dry air with the dehumidifier installed in the dehumidified room

When the dehumidifier is installed in the dehumidified room it would normally take the process air direct from the room without any duct system, with only a protection net for the inlet required. The dry air outlet would normally have a duct system designed for distribution of the dry air in the building.

Process and dry air with the dehumidifier installed outside the dehumidified room

When the dehumidifier is installed in a separate room all inlet and outlet openings are usually ducted.

The dehumidifier takes the process air as ambient air, or as pre-treated air (cooled/heated), or alternatively as return air from the dehumidified room. The dry air from the dehumidifier can be connected for post treatment or ducted back to the dehumidified room.

A damper can be installed in the process air duct, enabling correct commissioning of the dry air volume.

Electrical installation

See the electrical wiring diagram in appendix 1.

Commissioning

On initial start up, the following steps should be taken in this order:

1. Ensure that the external isolation switch is isolating the unit from the mains, and that the main switch on the dehumidifier is set in the OFF position.
2. Open the service panels of the dehumidifier and ensure no foreign objects are left inside the unit or in the electrical compartment
3. Ensure that the dry and wet air dampers are open, and that ducts are clean and free of blockages.
4. Check that air filters are installed and clean.
5. Rotate the fan impellers by hand and make sure they can move freely.
6. Ensure that the mains supply fuse is suitably rated.
7. Compare set values for motor circuit breakers with correct values in electrical wiring diagram in appendix 1.
8. Connect the dehumidifier to the main electrical supply by turning the isolation switch to ON, and check that all three phases are live. Terminal L1, L2, L3 in the dehumidifier.
9. Check to see that the lamp called STAND BY is lighting up, but that the machine doesn't start.
10. Start the dehumidifier for a short moment (3-4 seconds) by turning the main switch to the MAN position. While in operation, check that the rotor is slowly turning in the right direction, and the green operation lamp lights up. Stop the dehumidifier by turning the main switch to 0, and check the direction of rotation for the fans.
11. Mount the service panels and ensure they seal properly to the casing.
12. The dehumidifier is now ready for operation.
13. Start the dehumidifier and check that the unit is operating at the correct air volumes by taking measurements in the ducts. Always check the airflows on the overpressure side of the dehumidifier (dry air duct and wet air duct).
14. If requested check the dehumidification performance by measuring humidity in the dry air outlet from the dehumidifier. Compare the result with the performance chart on page 12.

Maintenance

NOTE ! *With all maintenance and service of the dehumidifier:*

- *Switch off the dehumidifier approximately 15 minutes prior to opening any service panel, allowing the heater to cool down.*
- *Disconnect the dehumidifier from main electrical supply by turning the external switch to the off position.*

The maintenance intervals for the dehumidifier depend on the surrounding environment and installation site. Recommended maintenance intervals could therefore differ from one installation to another. Incorrect maintenance and service may result in reduced dehumidification capacity.

Filters

The dehumidifier is equipped with two separate filterbanks, one for the process air and the other for the reactivation air. The filters are positioned at the respective inlets and will clean the air prior to entering the dehumidifier.

Intervals for cleaning or replacement of the filters will be determined by the amount of dust and particles in the air at the installation site.

We recommend that the filters are checked at least once a month.

The unit can be equipped with differential pressure measurement for checking the pressure drop over the filters.

Never operate the dehumidifier without the filters, as the rotor can be damaged by dust.

Rotor

The rotor is maintenance free. However should it be necessary to clean the rotor careful use of compressed air should be the first choice. With severe contamination the rotor can be washed with water.

Cleaning with water is no routine matter, please contact DehuTech AB or local distributor prior to this procedure.

Check the rotor bearing and the rotor surface once a year.

Electrical motors

The electrical motors are equipped with ball bearings. The bearings are designed to last the life of the motor and therefore no maintenance is required.

Check the motors once a year for any abnormal sound.

Heater

The reactivation electric heater does not need maintenance, but should be checked twice a year for any mechanical damage to the heating rods.

Rotor drive belt

Check the belt tensioning at regular intervals. The tensioning is maintained constantly by the belt tension device, and should not need to be adjusted during normal operation.

Sealings

Check the sealings at regular intervals for leakage, damage and dust.

General summary of maintenance intervals

	Filter	Rotor Bearing	Motors	Rotor drive	Heater	Sealings
On demand	√					√
Every 6 th month				√	√	
Every 12 th month		√	√			

Transportation

Observe the following for transport or handling of the dehumidifier:

- Check the dehumidifier on delivery for any transport damage.
- The dehumidifier should be protected from rain and snow.
- The dehumidifier should always stand upright on its feet.
- Never put other goods on top of the dehumidifier.
- Transport and lift the dehumidifier by fork-lift. Ensure that the forks go all the way to the back of the dehumidifier before lifting.

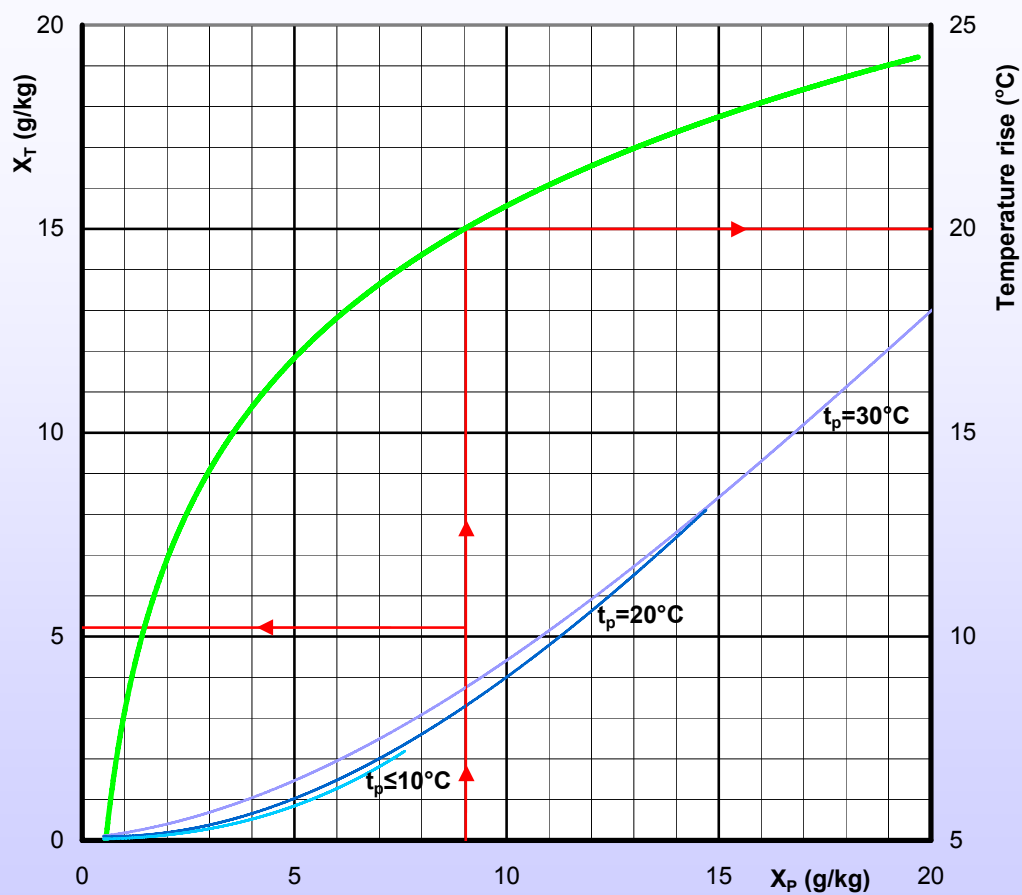
Fault finding

Malfunction	Possible cause of trouble	Corrective action
None, or reduced dehumidification capacity	Filter clogged Electrical heater faulty Airflow reduced No rotation of rotor Internal leakage in unit Altered air volumes Altered reactivation temperature Air leakage	Clean or replace filters Check fuses Check openings and dampers Check belt tensioning Check sealings and springs Measure and check air volumes Check reactivation heater Check panels and check seals
Main fuse faulty	Fan faulty Too large air volume Rotor does not rotate Reactivation heater faulty	Check fans and motors Check air volumes and dampers Check drive motor Check reactivation heater
Dehumidifier does not start	No control circuit Faulty control signal Phase fault Fuse for controls faulty	Check control fuses Check external start/stop signal Check main fuses and phase sequence Check electrical components
Rotor does not rotate	Drive belt is slipping Drive belt broken or worn Rotor jammed Drive motor faulty	Check belt tensioning Replace drive belt Check centre shaft, rim of rotor Replace complete gear motor
No dry- or wet air volume	Filter clogged Fan faulty Phase fault Ducts blocked	Clean or replace filters Check fan, motor and impeller Check main fuses and phase sequence Check dampers and ducts

Technical data

Performance chart

CAPACITY DIAGRAM

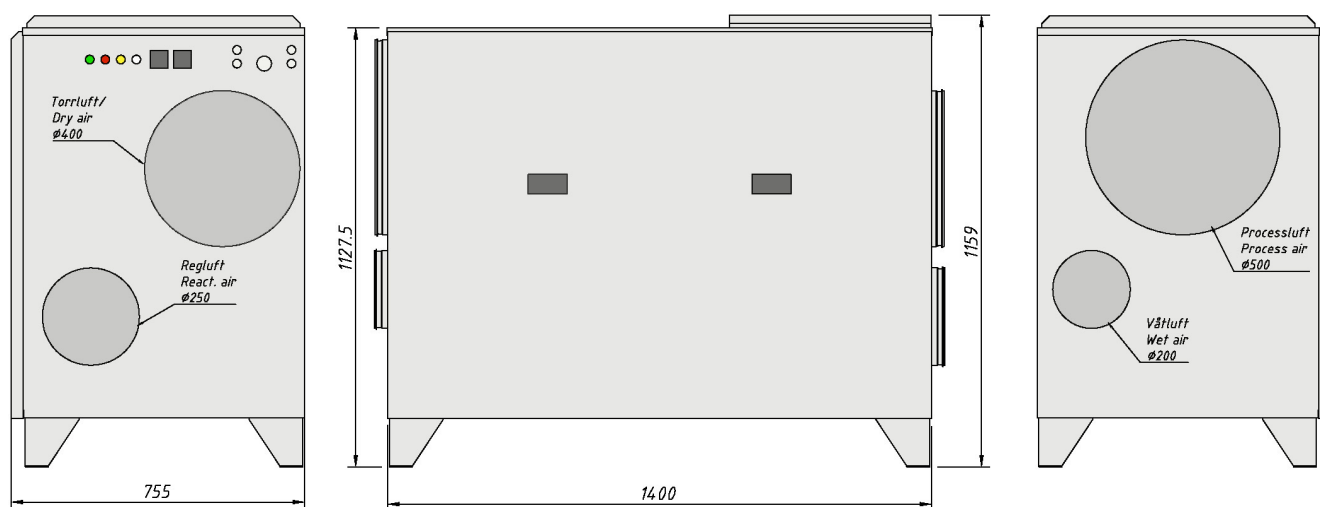


EXAMPLE:

Process air: $x_p = 9,0$ g/kg, $t_p = +20^\circ\text{C}$ giving

Dry air: $x_T = 3,3$ g/kg, $t_T = 20+20 = 40^\circ\text{C}$

Dimensions



The image above is a right-hand unit.

Technical data

Dehumidification capacity (at +20 °C and 60 % RH. See performance chart for other data)	16,4 kg/h
Dry air flow (at 250 Pa available pressure)	2 400 m ³ /h
Wet air flow (at 410 Pa available pressure)	800 m ³ /h
Power supply (3 x 400 V, 50 Hz)	25 kW
Current (A / phase) (connection fuse: 50 A / phase)	37,5 A
Weight	190 kg
Max noise level	75 dB(A)

Note: Valid only for standard units, with standard air-flows.

Spare parts list

Part	Technical specification	No installed	No of recommended spare parts	Comment
Drive motor	Gearmotor 230-240 V 50 Hz, low temp grease	1	1	
Capacitor	0,5 µF 700 V	1		
Belt pulley	18 H 075	1		
Drive belt	850 H 075	1		
Belt tensioner		1		
Process air fan	MB 22/9 T2M 2,2 kW	1		
Wet air fan	MB 20/8 T2K 1,1 kW	1		
Heater	Electrical	1		
Rotor	PPS 2400	1		
Process air filter	Corrugated paper filter 715 x 494 x 45 mm	1	2	
Reactivation air filter	Metal frame filter 300 x 300 x 25 mm	1	2	

Component data

Unit part:		Process air side	Reactivation air side	Rotor
Components:		(Dry air side)	(Wet air side)	
FANS				
Manufacturer		AirVac	AirVac	
Fan type		MB 22/9 T2M	MB 20/8 T2K	
Speed	rpm	2 850	2 750	
Model		RD	RD	
Air flow	m ³ /h	2 400	800	
Head pressure	Pa	1 000	1 000	
External pressure available	Pa	250	410	
MOTORS				
Manufacturer		Marin & Maskin AB	IEC	Rotek
Model		1 AT 90 L-2	80 T2 1.1	SM 65 30-4
Speed	rpm	2 850	2 750	1,5
Power	kW	2,2	1,1	14,5 VA
Voltage	V	400	400	230
Frequency	Hz	50	50	50
Amps	A	4,7	2,55	
Power factor	cos φ	0,84	0,84	
Protection class	IP	54	54	
Insulation class	ISO	F	F	
Specialties				
ROTOR				
Type				PPS 2400
Rotor speed	rph			11

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FILTERS				
Type		Corrugated paper	Metal frame	
Filter class		EU-5	EU-3	
Filter media		Glass fibre	Metal	
Dimensions	mm	1p. 715 x 494 x 45	1p. 300 x 300 x 25	
Pressure drop, clean filter	Pa	40	60	
Pressure drop, dirty filter	Pa	140	140	
HEATER, REACTIVATION AIR				
Power	kW		21,5	
Type			Electrical	
Voltage	V		400	
Number of elements				
Type of elements			Resistance	

Miscellaneous / Notes

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Appendix 1 - Electrical wiring